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(54) **CONTROLLING DRIVING MODES OF SELF-DRIVING VEHICLES**

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(58) **Field of Classification Search**

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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,975,791 A 11/1999 McCulloch
6,064,970 A 5/2000 McMillan et al.

6,326,903 B1 12/2001 Gross et al.
6,502,035 B2 12/2002 Levine
6,587,043 B1 7/2003 Kramer
6,622,082 B1 9/2003 Schmidt et al.
6,731,202 B1 5/2004 Klaus
7,124,088 B2 10/2006 Bauer et al.

(Continued)

FOREIGN PATENT DOCUMENTS

CN 1135063 11/1996
CN 202012052 10/2011

(Continued)

OTHER PUBLICATIONS

U.S. Appl. No. 14/887,388—Application Filed October 20, 2015.

(Continued)

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ABSTRACT

A computer-implemented method, system, and/or computer program product controls a driving mode of a self-driving vehicle (SDV). Sensor readings describe a current operational anomaly of an SDV that is traveling on a roadway. One or more processors compare a control processor competence level of the on-board SDV control processor that autonomously controls the SDV to a human driver competence level of a human driver in controlling the SDV while the SDV experiences the current operational anomaly. One or more processors then selectively assign control of the SDV to the on-board SDV control processor or to the human driver while the SDV experiences the current operational anomaly based on which of the control processor competence level and the human driver competence level is relatively higher to the other.

20 Claims, 8 Drawing Sheets

